Claims

1. A system for controlling the alignment of a rotor magnetically supportable in magnetic bearings, comprising:

a rotor assembly having a rotor supportable for rotation by at least first and second magnetic bearings, the rotor having a longitudinal axis and the magnetic bearings defining a principal axis therebetweeen, each of the bearings having magnetic poles with respective magnet coils associated therewith, the voltage and/or current flow through the magnet coils magnetically supporting the rotor for rotation relative to the bearings and selectively applying force vectors to the rotor to selectively position the longitudinal axis relative to the principal axis;

a processor means connected to the magnet coils for executing instructions to control the voltage and/or current to the magnet coils to apply force vectors to the rotor; and

instructions stored in or on a processor-readable media executable by the processor means for positioning the rotor such that the longitudinal axis thereof is not axially coincident with the principal axis.

2. The system of claim 1, wherein the longitudinal axis is off-set from the principal axis.

3. The system of claim 1, wherein the longitudinal axis is aligned non-parallel to the principal axis.

4. The system of claim 1, wherein the longitudinal axis is aligned non-parallel to the principal axis and defines a pivot point intermediate the ends of the rotor.

5. The system of claim 4, wherein the position of the pivot point along the longitudinal axis is determined as a function of the ratio of the force vectors applied by the first bearing and the second bearing.

6. The system of claim 1, wherein the processor means provides a selected

waveform to be impressed on the magnetic field of the magnetic bearings to excite the rotor in response to the waveform.

7. The system of claim 6, wherein the processor means generates the selected waveform in response to execution of a set of instructions in a recurring manner.

8. The system of claim 6, wherein the waveform is impressed on the rotor at a selected angle relative to a fixed reference coordinate system and remains stationary in that coordinate system during periods of time when the rotor is in motion.

9. The system of claim 6, wherein the waveform is impressed on the rotor at a selected angle relative to a fixed reference coordinate and rotates with the rotor when the rotor is in motion.

10. The system of claim 9, wherein the waveform perturbation rotates in synchronism with the rotor when the rotor is in motion.

11. The system of claim 6, wherein the waveform is selected from the group comprising sine waveform, sine squared waveform, cosine waveform, cosine squared waveform, random waveform, square waveform, squared pulse waveform, triangular waveform, single square waveform, single triangular waveform, sawtooth waveform.

12. Software stored in or on a computer-readable medium for causing a software-controlled processing device coupled to first and second magnetic bearing supporting a rotor to control positioning of the rotor in the bearings, the rotor having a longitudinal axis and the magnetic bearings defining a principal axis therebetween, each of the bearings having at least four magnetic poles with respective magnet coils associated therewith, the voltage and/or current flow through the magnet coils generating force vectors to support the rotor for rotation relative to the bearings, the force vectors under the control of the processor to selectively position the longitudinal axis relative to the principal axis, the software causing the processor to perform the function of:

controlling the force vectors to align the rotor in its bearings so that the

longitudinal axis thereof and the principal axis defined between the bearings are not axially coincident with one another.

13. The software of claim 12, wherein the longitudinal axis is off-set from the principal axis.

14. The software of claim 12, wherein the longitudinal axis is aligned non-parallel to the principal axis.

15. The software of claim 12, wherein the longitudinal axis is aligned non-parallel to the principal axis and defines a pivot point intermediate the ends of the rotor.

16. The software of claim 14, wherein the position of the pivot point along the longitudinal axis is determined as a function of the ratio of the force vectors applied by the first bearing and the second bearing.

17. The software of claim 16, wherein the processor means provides a selected waveform to be impressed on the magnetic field of the magnetic bearings to excite the rotor in response to the waveform.

18. The software of claim 16, wherein the processor means generates the selected waveform in response to execution of a set of instructions in a recurring manner.

19. The software of claim 16, wherein the waveform is impressed on the rotor at a selected angle relative to a fixed reference coordinate system and remains stationary in that coordinate system during periods of time when the rotor is in motion.

20. The software of claim 16, wherein the waveform is impressed on the rotor at a selected angle relative to a fixed reference coordinate and rotates with the rotor when the rotor is in motion.

21. The software of claim 20, wherein the waveform perturbation rotates in synchronism with the rotor when the rotor is in motion.

22. The software of claim 16, wherein the waveform is selected from the group comprising sine waveform, sine squared waveform, cosine waveform, cosine squared waveform, random waveform, square waveform, squared pulse waveform, triangular waveform, single square waveform, single triangular waveform, sawtooth waveform.

23. A system for controlling the alignment of a rotor magnetically supportable in magnetic bearings, comprising:

a rotor assembly having a rotor supportable for rotation in a vertical or near vertical alignment by at least one magnetic thrust bearing and at least first and second magnetic radial bearings, the rotor having a longitudinal axis and the radial magnetic bearings defining a principal axis therebetweeen, each of the bearings having magnetic poles with respective magnet coils associated therewith, the voltage and/or current flow through the magnet coils magnetically supporting the rotor for rotation relative to the bearings and selectively applying force vectors to the rotor to selectively position the longitudinal axis relative to the principal axis;

a processor means connected to the magnet coils of the radial bearings for executing instructions to control the voltage and/or current to the magnet coils of the radial bearing to apply force vectors to the rotor;

instructions stored in or on a processor-readable media executable by the processor means for positioning the rotor such that the longitudinal axis thereof is not axially coincident with the principal axis.

24. The system of claim 23, wherein the longitudinal axis is off-set from the principal axis.

25. The system of claim 23, wherein the longitudinal axis is aligned non-parallel to the principal axis.

26. The system of claim 23, wherein the longitudinal axis is aligned non-parallel to the principal axis and defines a pivot point intermediate the ends of the rotor.

27. The system of claim 26, wherein the position of the pivot point along the longitudinal axis is determined as a function of the ratio of the force vectors applied by the first radial bearing and the second radial bearing.

28. The system of claim 23, wherein the processor means provides a selected waveform to be impressed on the magnetic field of the radial bearings to excite the rotor in response to the waveform.